

AMPHIPODS OF THE FAMILY AMPELISCIDAE (GAMMARIDEA)

I. *AMPELISCA BICARINATA*, A NEW SPECIES OF AMPHIPOD FROM THE GULF OF MEXICO

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ABSTRACT A new species of the benthic amphipod genus *Ampelisca* Kroyer, is described and illustrated. Previous records of the Pacific species *Ampelisca cristoides* Barnard, 1954, from the western North Atlantic are now assignable to the proposed new species, *Ampelisca bicarinata*. These two closely related sibling species are compared and their specific differences enumerated.

This report, which describes a new northwestern Atlantic cognate species of *A. cristoides* Barnard, 1954, is the first in a series that will deal with members of the benthic amphipod family Ampeliscidae. Material examined for this report came primarily from the Outer Continental Shelf studies of the Minerals Management Service (formerly the Bureau of Land Management) and a study of the benthos of the Mississippi Sound performed by Barry A. Vittor and Associates.

Ampelisca bicarinata, new species, Figures 1, 2, and 3.

Ampelisca cristoides: Barnard 1954b, p. 4, pl. 1, figs. H-J (not *A. cristoides* of Barnard, 1954a).

Material Examined — HOLOTYPE, adult ♀ (16 mm), USNM 210454, 30°01'06"N, 88°20'42"W, Mississippi, November 1980, fine sand, poorly sorted, 24 m; PARATYPES; 2 ♀♀, 1 juvenile, AHF 809, 30°09.89'N, 88°27.63'W, Mississippi, November 1980, medium sand, 24 m, 1 ♀, GCRL 1118, 28°38'N, 97°20'W, DeSoto Canyon, Florida, 27 May 1979, coarse sand, 90 m; 1 ♂, 2 ♀♀, USNM 210455, same collection data; 5 ♀♀, MNHN Am2438, 30°10'N, 87°28'W, Mississippi, November 1980, coarse sand, 24 m.

Other Material — 5 ♀♀, November 1980, 30°09'12"N, 88°38'12"W, fine sand, 13 m; 3 ♀♀, November 1980, 30°06'12"N, 88°22'48"W, fine sand, 12 m; 2 ♀♀, November 1980, 30°04'43"N, 88°12'06"W, fine sand, 12 m; 2 ♀♀, November 1980, 30°01'12"N, 88°17'W, fine sand, 23 m; 4 ♀♀, November 1980, 30°10'48"N, 88°14'W, medium sand, 14 m; 11 ♀♀, November 1980, 30°09'24"N, 88°16'24"W, medium sand, 16 m; 1 ♀, November 1980, 30°09'18"N, 88°11'12"W, medium sand, 16 m; 1 ♀, November 1980, 30°03'18"N, 87°56'W, medium sand, 15 m; 3 ♀♀, November 1980, 30°02'12"N, 87°52'12"W, medium sand, 21 m; 3 ♀♀, January 1976, 29°53'30"N, 88°12'57"W, sand, 32 m; 2 ♀♀, January 1976, 29°43'29"N, 87°43'29"W, medium

sand, 35 m; 1 ♀, July 1976, 29°45'29"N, 87°46'30"W, fine sand, 37 m; 3 ♀♀, July 1976, 29°40'30"N, 87°37'W, medium sand, 36 m; 4 ♀♀, July 1976, 29°54'59"N, 86°04'59"W, coarse sand, 37 m; 2 ♀♀, July 1976, 29°55'59"N, 86°06'28"W, coarse sand, 38 m; 2 ♀♀, January 1976, 29°51'N, 86°06'30"W, medium sand, 41 m; 3 ♀♀, July 1976, 29°46'N, 86°12'30"W, coarse sand, 52 m; 1 ♀, July 1976, 29°24'N, 85°42'02"W, fine sand, 42 m; 1 ♀, July 1976, 29°42'N, 84°11'W, fine sand, 14 m; 1 ♀, July 1976, 29°37'01"N, 84°17'W, fine sand, 19 m; 1 ♀, July 1976, 27°57'N, 83°09'W, fine sand, 19 m; 1 ♀, July 1976, 27°52'30"N, 83°33'59"W, medium sand, 34 m; 1 ♀, January 1980, 27°37'06"N, 82°59'42"W, medium sand, 15 m; 1 ♀, January 1980, 27°38'06"N, 82°54'W, fine sand, 12 m; 1 ♀, January 1980, 27°37'06"N, 82°54'W, sand, 12 m; 3 ♀♀, October 1979, 27°38'06"N, 82°55'06"W, fine sand, 12 m; 1 ♀, October 1979, 27°36'30"N, 82°55'48"W, coarse sand, 12 m; 1 ♀, January 1980, 27°38'48"N, 82°55'48"W, fine sand, 11 m; 1 ♀, January 1980, 27°38'48"N, 82°53'24"W, medium sand, 9 m; 1 ♀, January 1980, 27°36'30"N, 82°53'24"W, medium sand, 12 m; 1 ♀, July 1976, 26°25'N, 82°15'09"W, fine sand, 11 m; 2 ♀♀, July 1976, 26°25'N, 82°58'W, fine sand, 33 m; 1 ♀, July 1981, 26°16'30"N, 82°38'W, fine sand, 26 m; 3 ♀♀, January 1982, 25°47'15"N, 82°25'W, sand, 26 m.

Diagnosis — (Female 14 mm) lower frontal margin of head deeply concave, parallel to upper margin; ratio of length of antenna I peduncular segments 1, 2, and 3 is 100:150:60; antenna I flagella reaching just beyond 4th peduncular segment of antenna II; ratio of antenna II peduncular segments 4 and 5 is 100:70; antenna II about 4/5 length of body; first coxal plate notched anteroventrally; dactyls of pereopods 3 and 4 nearly straight; pereopod 5 posterior lobes of basis gently rounded, bare; pereopod 6 posterior lobe with straight margin, bare; pereopod 7, carpus and merus posterior lobes well-developed, dactyl attenuate, curved forward; pleosomite 3 bicarinate; urosomite 1 with sinuous dorsal margin; uropods 1 and 2 equal, outer ramus of uropod 2 with long terminal spine; uropod 3 rami

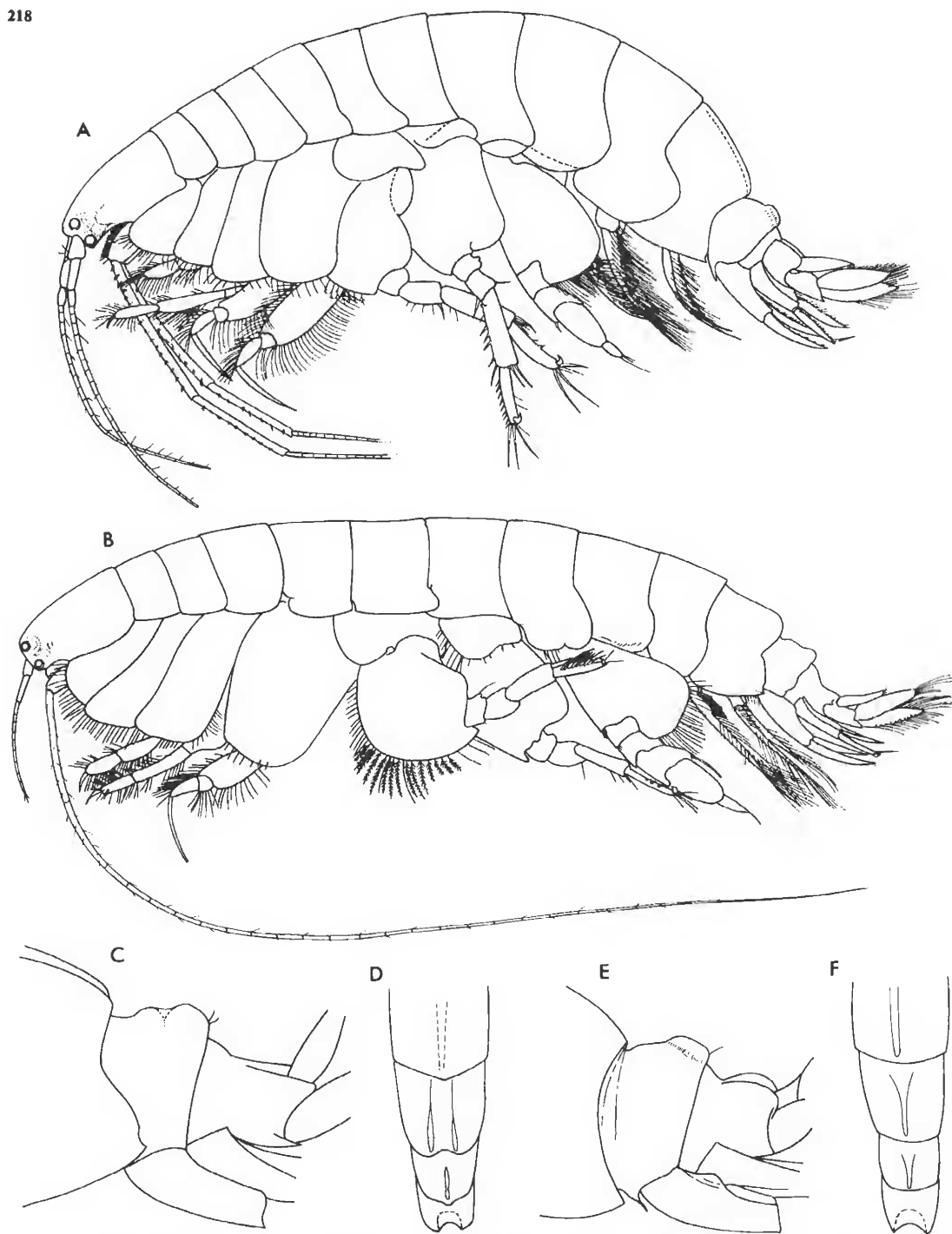


Figure 1. A) Paratype male; B) Paratype female; C) lateral, and D) dorsal view of urosomite of female; E) lateral, and F) dorsal view of urosomite of male.

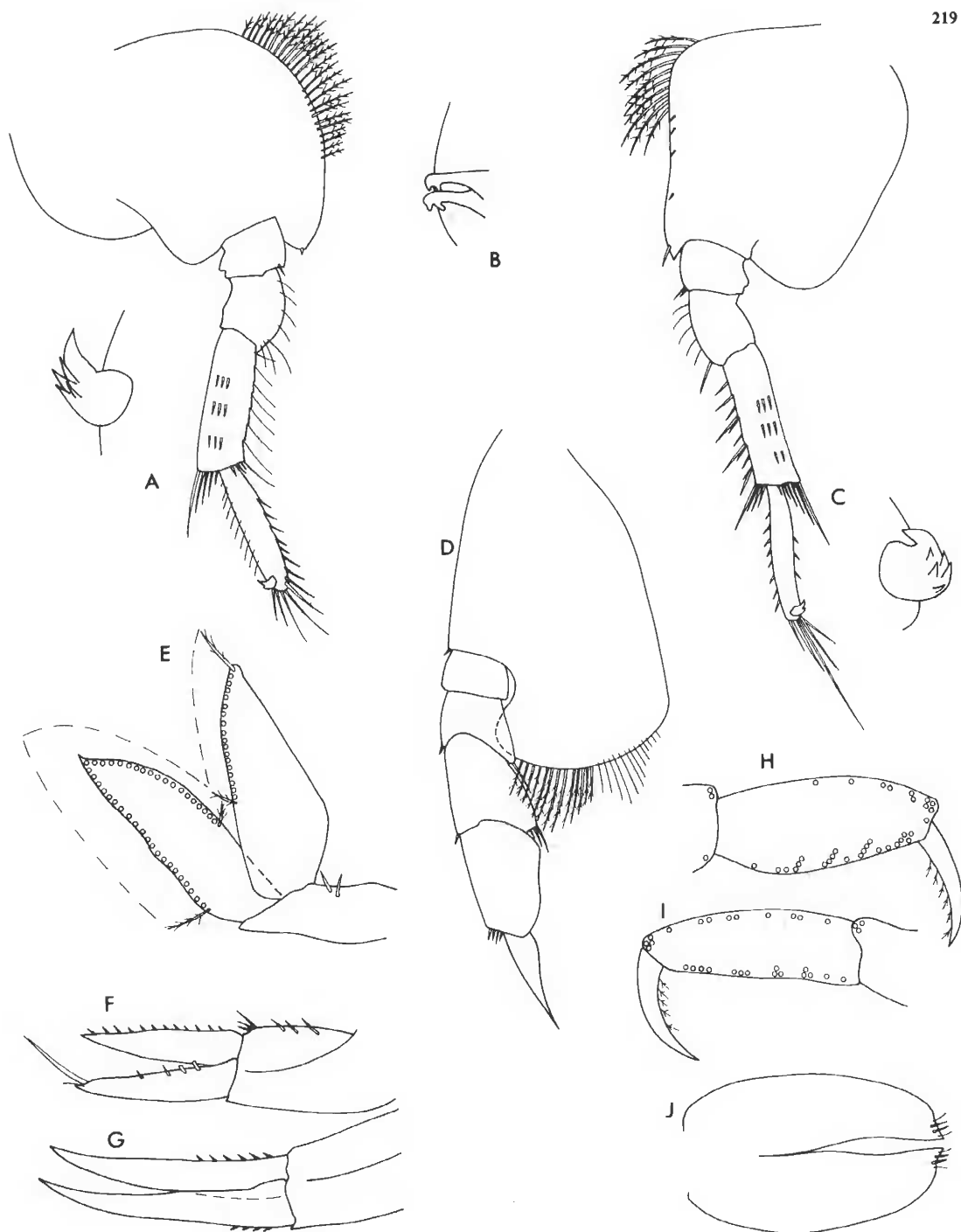


Figure 2. A) Pereopod 5 and detail of dactyl; B) Coupling hooks of male; C) pereopod 6 and detail of dactyl; D) pereopod 7; E) uropod 3; F) uropod 2; G) uropod 1; H) distal segments of pereopods 1, and I) 2; J) telson.

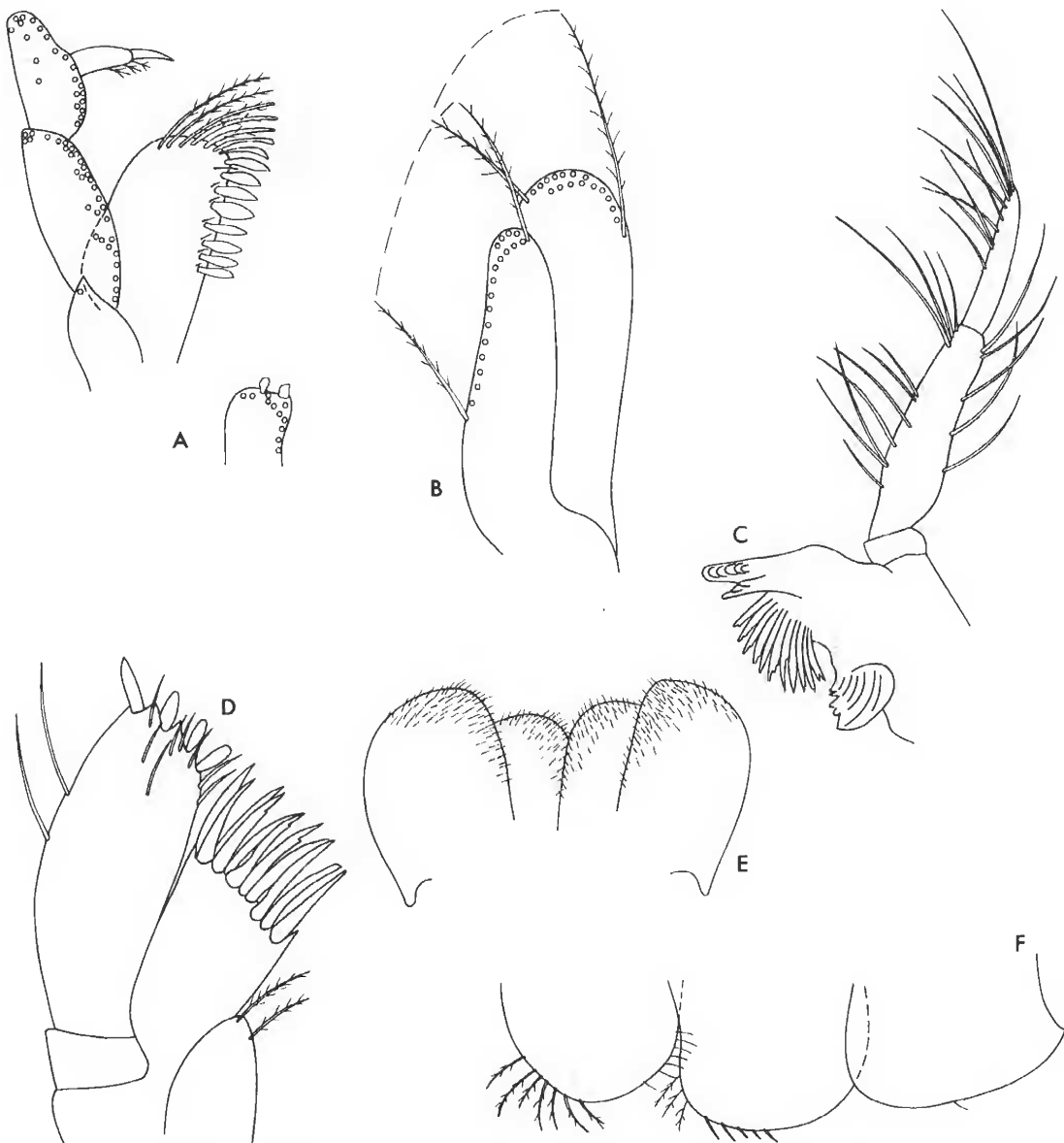


Figure 3. A) Maxilliped; B) Maxilla 2; C) mandible; D) maxilla 1; E) upper lip; F) epimeral plate 1-3.

foliaceous; 3rd epimeral plate slightly sinuous with small posteroventral tooth; dactyls of legs 5 and 6 with numerous accessory teeth; maxilliped, outer plate with about 10 chisel-shaped teeth; inner plate with 2 chisel-shaped teeth and 3 setal spines distally; maxilla 2 with oblique medial margin; gills of female sac-like.

Description — (Female 13.8 mm) — Head with lower margin parallel to upper, lower corneal lens on anteroventral corner, upper corneal lens just about at base of antenna I, head little shorter than first 3 body segments. Antenna I short, about 1/5 length of body, 1st peduncular segment short, stout, with few scattered setae, 2nd and 3rd segments

slimmer with few simple setae, ratio of length of first 3 peduncular segments 100:150:60, flagellum with 9 segments, extending just to tip of 4th peduncular segment of antenna II, flagella with few simple setae at articulations, antenna II about equal to body in length.

Maxilliped: inner plate small, rectangular with apical plumose setae extending along inner margin, 2 chisel-shaped teeth and 1 apical setal spine, 1 subapical facial setal spine; outer plate stout, not reaching end of 2nd article of palp, inner margin with 10 chisel-shaped teeth and 2 plumose setae, chisel-shaped teeth with few accessory setal spines, 2nd article of palp with inner margin lined with 6 setal rows, few setae on outer distal margin, 3rd palp article setose, elongate with dactyl inserted at midlength, broadest basally, dactyl with 2 serrate spines. Maxilla 2; inner plate small, subtriangular, with 2 apical plumose setae, outer plate broad at base with 11 apical spines, all with smaller accessory teeth, palp segment 2 broad distally with few facial simple setae, 1 or 2 simple lateral setae inserted at midlength, 4 apical spines and 3 cusp teeth; basal segments with long cilia. Maxilla 1; inner plate broad basally, narrowing to tip with oblique, slightly concave margin, lateral margin with plumose setal row becoming submarginal distally, apex with long, curved setal spines; outer plate slightly expanded distally with submarginal row of plumose setae, apex with curved setal spines, a few facial plumose setae, basal segments with long cilia. Left mandible: molar heavily sclerotized, spine row with 12 spines, lacinia mobilis well developed with 3 accessory teeth, incisor large with 4 accessory teeth; 2nd palp article elongate, slightly inflated basally, lined with long simple setae, inner margin with few long simple setae submarginally. 3rd article 1/2 length of 2nd with 3 apical simple setae and 5 scattered along margin. Coxa 1 produced anteriorly with large notch at posteroventral angle; coxae 2-4 without notch, normal for genus.

Pereopods 1 and 2 very similar; basis linear, slightly expanded distally with long simple setae on anterior and posterior margins; ischium short with few simple setae; merus short with long simple setae on posterior margin (densest on pereopod 1); carpus of pereopod 1 stout, slightly inflated, length 1.2 times propodus with long, dense, simple setae on posterior margin, carpus of pereopod 2 elongate, thin, 2.5 times length of propodus with long, dense, setae posteriorly and scattered groups of simple setae on anterior margin; propodus of pereopod 1 slightly inflated basally with dense ventral setae, propodus of pereopod 2 slim with dense simple setae ventrally; dactyl of pereopods 1 and 2 short, slightly curved. Pereopods 3 and 4 very similar with 4th slightly more massive; basis elongated, fringed with long plumose setae on margins; carpus short, subquadrate with long plumose setae; propodus long, about 2 times width with plumose dorsal setae on few simple setae on ventral margin; dactyl long, attenuate, nearly straight, length greater than combined propodus and carpus. Pereopod 5; basis expanded, anterior margin evenly rounded with long plumose setae be-

coming submarginal posteriorly, anterior margin slightly overhanging ischium, posterior margin bilobate, lobes gently rounded, bare; ischium short with few simple setae; merus geniculate, anterior and posterior margins with few long simple setae; carpus elongate, rectangular with long simple setae anteriorly, bare posteriorly except for 2 sets of 3 short spines inset, posterior distal margin with several spines varying long to short; propodus elongate, subrectangular with anterior margin lined with setae, terminating with long plumose setae and serrated spines, posterior margin with numerous long serrated spines; dactyl subterminal, main fang with numerous accessory teeth. Pereopod 6: basis expanded, anterior margin angular with long plumose setae at angle and with short simple setae elsewhere, anterior lobe slightly overhanging ischium, posterior lobe with straight margin, bare; ischium short with few simple setae anterodistally; merus short, slightly geniculate with simple setae along anterior margin; carpus elongate, subrectangular with spines (sometimes in groups of 2) along anterior margin and groups of spines posterodistally grading from long to short, longest spine 1/2 length of propodus, 2 subterminal groups of spines; propodus elongate with 2 posterior spines and a series of spines along anterior margin, long terminal spines; dactyl subterminal on propodus with numerous accessory teeth and main fang. Pereopod 7: basis expanded, anterior margin straight with few small spines, posterior margin lobate, extending distally to top of carpus, posterodistal margin oblique, gently rounded, distal margin with long plumose setae and rimmed with minute tubercles; ischium short, subrectangular with 2 anterodistal short spines; merus short with anterior lobe having 4 short spines, posterior lobe 1/2 length of carpus with several long plumose setae; carpus more elongate than merus, anterior lobe well produced with 5 submarginal anterior spines, posterior lobe longer than anterior, blunt apex armed with few short spines and long plumose setae; propodus elongate, expanded proximally, 4 short anterodistal spines and a simple seta posterodistally; dactyl attenuate, anteriorly curved distally; ratio of ischium:merus:carpus:propodus:dactyl is (measured at midlength of segment) 100:82:182:345:235.

Uropod 1 peduncle and rami subequal in length, outer margin of peduncle without spines, inner margin lined with spines, outer ramus devoid of spines, inner ramus with numerous spines along proximal 1/2 of length; uropod 2 extending to end of uropod 1, peduncle little longer than rami, outer margin without spines, inner margin of peduncle lined with spines, outer ramus lined with dorsal spines and with single elongated terminal spine, inner margin lined with spines along entire length; uropod 3 extending 1/2 length beyond telson, outer ramus flattened with plumose setae on distal 1/2 of ventral margin only, inner ramus flattened with plumose setae along ventral margin and on distal 1/2 of dorsal margin; telson deeply cleft with 2 dorsal spines and 4 terminal spines on each lobe.

Epimeral plates 1–3 all rounded anteriorly, plates 1 and 2 with plumose setae on anteroventral margin, plate 1 with simple setae posteriorly, plate 3 with posterior corner produced into weak tooth.

Male — Similar to female in most features except: 1) increased setation of antennae; 2) increased size of pleosome corresponding to increased size of pleopods; 3) a single carina on the pleosomites extends up onto the body somites; 4) distal spine of exopod of uropod 2 smaller; 5) dorsal margins of 3rd urosomite produced into collar; 6) carina of urosomite not bicusate; 7) antenna I flagellum extending almost to end of 5th peduncular segments of antenna II; 8) spines of uropods much more numerous; 9) general body size smaller (10.5 mm); 10) gills of male strongly pleated.

Disposition of Material — The type and/or paratypes have been deposited at the U. S. National Museum of Natural History (USNM), the Allan Hancock Foundation (AHF), the Gulf Coast Research Laboratory (GCRL) and Muséum National d'Histoire Naturelle (Paris) (MNHN). Material examined for this report has been deposited at the USNM.

Variation — Considerable variation has been observed in several features of *Ampelisca bicarinata*. Much of the variation appears to be size-dependent and involves the length of the antennae, shape of the carina of the urosome, the posteroventral process of the third epimeral plate and the relative length of antenna I to the peduncular segments of antenna II. Juveniles of the proposed species often possess an elongate antenna II, which may exceed the length of the body. This variation is common among juvenile ampeliscids where the antennae may be longer than those of the adult. The "normal" condition is where the antennal flagellum is roughly 4/5 the length of the adult animal. The shape of the carina of the urosomite is also a feature which varies from one individual to the next. This variation is also evident in the cognate Pacific species *Ampelisca cristoides*. Barnard (1954b) illustrated some of the variation found in this feature but had no material from the Gulf of Mexico for comparison. In the eastern and northern Gulf populations, the carina is more nearly the saddle-shaped carina, whereas in the lower latitudes the bicusate nature of the carina becomes more obscured.

The posteroventral margin of the third epimeral plate is often a distinctive character within the genus *Ampelisca* and variation should be noted when found. In most specimens the process is easily discerned but in some specimens it is reduced and nearly absent. Another variation observed in some specimens is the relative length of the flagellum of antenna I to the peduncular segments of antenna II. The condition most often observed is where the tip of the flagellum extends just beyond the articulation of peduncular segments 4 and 5 of antenna II. However, specimens have been examined where the flagellum does not exceed the length of the 4th segment. No relationship was found with either the sex or maturity of the "atypical" specimens.

Range — *Ampelisca bicarinata* has been examined from

the Gulf of Mexico from southeastern Florida northward to the waters off Texas and off Georgia in the Atlantic. The previous records of Barnard (1954b) and Mills (1967) indicate this species ranges into the Caribbean Sea off Colombia and into the temperate North Atlantic. Specimens from the Gulf of Mexico were examined from a bathymetric range of 9–59 m.

Etymology — The specific name is derived from the Latin "bi," two, and "carinus," ridge. It refers to the double crested carina on the third pleosomite of the female.

Remarks — *Ampelisca bicarinata* is closely related to *A. cristata* Holmes, 1908, and *A. cristata microdentata* Barnard, 1954. It may be separated from these taxa by the shorter antenna I of the female, the well developed lateral carinae of pleosome 3, and 2 rather than 3 chisel-shaped teeth on the terminal margin of the inner plate of the maxilliped and the stronger carina of the urosome.

Ampelisca bicarinata and *Ampelisca cristoides* are very closely related and appear to be recently evolved sibling species. Based on the comparative morphologic evidence presented in Table I and available geological data we suggest that the northeastern Pacific and northwestern Atlantic populations of the ancestral stock of these two species became reproductively isolated during the emergence of the isthmus of Panama some 5 to 23 million years ago (Woodring 1974).

Ecological Notes — In the northern Gulf of Mexico, *Ampelisca bicarinata* is a common member of the benthic polyhaline communities where sand is abundant. Sediment analysis of the occurrence of the proposed species from the area just south of Mississippi Sound has shown the animal is most common in sediments with a very high sand fraction. In stations where sediment data are available, the species was collected from substrata with ranges of 74 to 99% sand. Samples collected from outside the mouth of Tampa Bay were gathered from bottoms of 88 to 99% sand. It appears the species is restricted to regions with very high sand fractions and oceanic salinities.

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TABLE 1.
Comparison of selected morphological characters.

	<i>A. bicarinata</i>	<i>A. cristoides</i>
Antenna I peduncular ratio	100:150:80	100:190:80
Antenna I flagellum length	flagellum reaches just beyond articulation of segments 4 and 5 of Antenna II peduncle	flagellum reaches to distal 1/2 of Antenna II peduncular segment 5
Number of flagellar articles	Antenna I: 10 Antenna II: 30	Antenna I: 16 Antenna II: 38
Spines on exopod of uropod 2	6-13	16-22
Terminal spine of uropod 2	greater than 1/2 length of exopod	less than 1/2 length of exopod
Pereopod 2	carpus greater than 1/2 length of propodus	carpus less than 1/2 length of propodus
Pereopod 5	anterodistal lobe of basis well developed	anterodistal lobe of basis poorly developed
Pereopod 7	posterior lobe of merus less than 1/2 length of carpus	posterior lobe of merus greater than 1/2 length of carpus
Urosomite 3	dorsal collar poorly developed	dorsal collar well developed
Carina of urosomite	poorly bicusperate; large	saddle-shaped; massive
Mandible	12 rakers	14 rakers
Maxillipedal inner plate	2 blunt chisel-shaped teeth	2 acuminate chisel-shaped teeth

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